

**Amendment and Response**

Applicant: Jeffrey Allen Neilsen et al.

Serial No.: 10/603,896

Filed: June 24, 2003

Docket No.: 100201650-1

Title: METHOD AND SYSTEMS FOR PRODUCING IMPROVED COLORING IN AN OBJECT  
PRODUCED THROUGH SOLID FREEFORM FABRICATION

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**REMARKS**

The following Remarks are made in response to the Non-Final Office Action mailed March 10, 2009, in which claims 1-19 and 48-64 were rejected.

With this Amendment, claims 65-68 have been added, and claims 1 and 48 have been amended to clarify Applicant's invention.

Claims 1-19 and 48-68, therefore, remain pending in the application and are presented for reconsideration and allowance.

**Claim Rejections under 35 U.S.C. § 103**

Claims 1-19 and 48-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. U.S. Publication No. 2004/0145088 in combination with either Shields et al. U.S. Patent No. 5,181,045 (Shields I) or Shields et al. U.S. Patent No. 5,428,383 (Shields II).

With this Amendment, independent claim 1 has been amended to clarify that the method includes "**causing a reaction between the first material and the second material that renders the colorant insoluble and reduces penetration of the colorant to keep the colorant near a surface of the layer.**"

With this Amendment, independent claim 48 has been amended to clarify that the method includes "**forcing the colorant to become insoluble and precipitating the colorant out of the first material upon contact of the first and second materials such that the colorant remains near a surface of the layer.**"

Support for these amendments is provided in the Specification at least at, for example, page 8, lines 1-18. Accordingly, as outlined in the Specification at page 8, lines 3-8, with the present invention, "[c]olorant in the ejected material (either an ejected binder or an ejected build material) is caused to remain near the surface of the layer being fabricated, such that the color accuracy of the layer, and thus the completed object, is improved by, for example, reducing 'washed out' colors and maintaining sharp and crisp borders between different colors in the object."

With respect to the Patel, Shields I, and Shields II references, Applicant submits that these references, individually or in combination, do not disclose a method as claimed in independent claim 1 including, amongst other things and in the combination recited, causing

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a reaction between the first material and the second material that renders the colorant insoluble and reduces penetration of the colorant to keep the colorant near a surface of the layer. In addition, Applicant submits that these references, individually or in combination, do not disclose a method as claimed in independent claim 48 including, amongst other things and in the combination recited, forcing the colorant to become insoluble and precipitating the colorant out of the first material upon contact of the first and second materials such that the colorant remains near a surface of the layer.

Regarding the Patel reference, the Patel reference provides a process for forming a three-dimensional article in sequential cross-sectional layers comprising defining a layer of a first material, applying a second material in the form of a liquid reagent to the layer of first material, and repeating these steps to form successive layers (Patel, para. [009]). In this regard, the Patel reference provides that "...the reactive powder and the liquid react chemically to form a new chemical component" (Patel, para. [0013]). In addition, the Patel reference provides that "...colour rendition in the formed object is available by having colourisable or decolourisable reactive powder or the first liquid or by incorporating colourants in the dispensing liquids" (Patel, para. [0037]).

Regarding the applied liquid, the Patel reference provides that the applied liquid reagent comprises a viscosity lowering diluent and asserts that:

*It is very important in the most preferred case that the diluent in the applied liquid is a reactive diluent, so that the whole of the applied liquid is incorporated with powder to form a seamless composite of the applied liquid and powder* (emphasis added) (Patel, para. [0012]).

Continuing, regarding the applied liquid comprising a diluent, the Patel reference asserts that:

*...it improves penetration of the liquid into the body of the powder, thereby achieving a more homogeneous distribution of the reactants while also enabling rapid aggregation of the powder improving resolution and further allowing the reactive liquid present in the jet liquid to react firmly with the surface of and interior of the powder* (emphasis added) (Patel, para. [0015]).

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As the Patel reference asserts that it is "very important" to form a "seamless composite" of the applied liquid and powder, and includes a liquid comprising a diluent that "improves penetration" of the liquid into the powder to achieve a more "homogeneous distribution" of the reactants and enabling rapid "aggregation" of the powder while also allowing the liquid to react with the "surface of and interior of" the powder, and incorporates the colourants in the liquid, the colourants of the Patel reference will also form part of the "seamless composite" of the applied liquid and powder with "improve[d] penetration" of the liquid into the powder and a more "homogeneous distribution" of the reactants enabling rapid "aggregation" of the powder and reaction of the liquid with "the surface of and interior of" the powder. Accordingly, Applicant submits that the Patel reference teaches away from causing a reaction between the first material and the second material that renders the colorant insoluble and reduces penetration of the colorant to keep the colorant near a surface of the layer, as claimed in independent claim 1, and teaches away from forcing the colorant to become insoluble and precipitating the colorant out of the first material upon contact of the first and second materials such that the colorant remains near a surface of the layer, as claimed in independent claim 48.

Furthermore, Applicant submits that modifying the Patel reference to cause a reaction between the first material and the second material that renders the colorant insoluble and reduces penetration of the colorant to keep the colorant near a surface of the layer, as claimed in independent claim 1, or to force the colorant to become insoluble and precipitate the colorant out of the first material upon contact of the first and second materials such that the colorant remains near a surface of the layer, as claimed in independent claim 48, would change the principle of operation of the Patel reference and render the Patel reference unsatisfactory for its intended purpose. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). In addition, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

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In view of the above, Applicant submits that independent claims 1 and 48, and the dependent claims depending therefrom, are each patentably distinct from the Patel, Shields I, and Shields II references and, therefore, are each in a condition for allowance. Applicant, therefore, respectfully requests that the rejection of claims 1-19 and 48-64 under 35 U.S.C. 103(a) be reconsidered and withdrawn and that claims 1-19 and 48-64 be allowed.

**New Claims**

With this Amendment, new claims 65-68 have been added with claims 65 and 66 depending directly or indirectly from independent claim 1, and claims 67 and 68 depending directly or indirectly from independent claim 48.

New claims 65 and 67 each recite "**inhibiting migration of the colorant**" into the object.

New claims 66 and 68 each recite that "**the pH reaction decreases solubility of the colorant**."

With respect to the Patel, Shields I, and Shields II references, Applicant submits that these references, individually or in combination, do not disclose inhibiting migration of the colorant into the object, as claimed in claims 65 and 67, and do not disclose a pH reaction decreasing solubility of the colorant, as claimed in claims 66 and 68

In view of the above, Applicant submits that claims 65-68 are each patentably distinct from the Patel, Shields I, and Shields II references and, therefore, are each in a condition for allowance. Applicant, therefore, respectfully requests that claims 65-68 be allowed.

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**CONCLUSION**

In view of the above, Applicant respectfully submits that pending claims 1-19 and 48-68 are all in a condition for allowance and requests reconsideration of the application and allowance of all pending claims.

Any inquiry regarding this Amendment and Response should be directed to either Jeff Limon at Telephone No. (541) 715-5979, Facsimile No. (541) 715-8581 or Scott A. Lund at Telephone No. (612) 573-2006, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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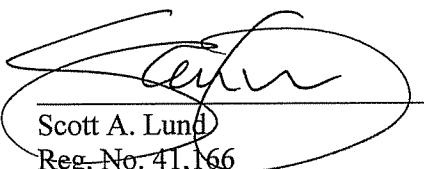
Respectfully submitted,

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